Remarks

Claims 1-18 are pending, and claims 1-18 stand rejected. The Applicants have cancelled claims 2, 8, and 14 and have amended claims 1, 3-4, 7, 9-10, 13, and 15-16 in this Response. Specifically, the Applicants have amended claims 1, 7, and 13 to incorporate features from cancelled claims 2, 8, and 14. The Applicants respectfully traverse the rejections set forth by the Examiner.

35 USC § 103 Rejection

The Examiner has rejected all claims under 35 USC § 103(a) as being unpatentable over US Patent Number 5,097,518 (Scott) in further view of various combinations of US Patent Number 5,347,597 (Stephenson) and US Patent Number 6,563,957 (Li). Specifically, the Examiner rejected claim 2 in further view of Li. The Applicants submit that Li does not teach or suggest the features of claim 2, which have been incorporated into claim 1.

Claim 1 as amended recites a method of scaling a halftone image using error diffusion. According to the method, a first matrix of n x m pels is identified in a halftone image. An average intensity of the first matrix of pels is calculated. A second matrix of (n+1) x m pels is generated from the first matrix of pels by inserting a line of pels in the first matrix of pels. Additionally, a scaled output matrix of (n+1) x m pels is generated from the second matrix of pels by assigning new pel values to each pel in the line of pels using an error diffusion process, where the average intensity of the scaled output matrix of pels is substantially unchanged from the average intensity of the first matrix of pels. A (n+1) x m shift matrix is generated based on the second matrix and including at least one shift indicator defining an exchange between a pel and its neighboring pel, where a probability of occurrence of the at least one shift indicator in a position of the (n+1) x m shift matrix is proportional to a distance between the position of the line of pels in the second matrix. At least one pel is exchanged in the scaled output matrix with its neighboring pel based on the shift matrix. The previous steps are performed for each unidentified matrix of n x m pels in the halftone image to generate a scaled output of the halftone image.

The Applicants submit that none of the cited art teaches or suggests "wherein a probability of occurrence of the at least one shift indicator in a position of the (n+1) x m shift

matrix is proportional to a distance between the position and the line of pels in the second matrix" as recited in claim 1. The Examiner suggests that neither Scott nor Stephenson teaches this limitation (Office Action, page 7). The Applicants agree. In rejecting claim 2 in the Office Action, the Examiner suggests that Li teaches this limitation in FIG. 9. The Applicants respectfully disagree.

Li discloses in Column 9, lines 13-18 that FIG. 9 illustrates a diagram 20 showing the distribution of error, where the current pixel being processed is indicated by (P). Li further discloses that error is diffused according to the tone dependent error weightings shown in FIG. 9. Thus, the Applicants submit that FIG. 9 illustrates a error diffusion process, not a shift matrix. Li further discloses in Column 10, lines 4-21 that a cost equation (equ. 17) is used to evaluate the impact of toggling a pixel or swapping its value with one of its eight nearest neighbors. If the change reduces the error based on equ. 17, the change is accepted. The applicants submit that equ. 17 is not a probability function based on any distance between a pixel being evaluated in Li and any other pixel in the image being processed.

The Applicants therefore submit that claim 1 is non-obvious in view of the cited art. Similar arguments apply for claims 7 and 13. Dependent claims 3-6, 9-12, and 15-18 are non-obvious for at least depending on base claims 1, 7, and 13.

Conclusion

The Applicants submit that claims 1, 3-7, 9-13, and 15-18 are non-obvious in view of the cited art, and therefore, respectfully ask the Examiner to allow claims 1, 3-7, 9-13, and 15-18.

Respectfully submitted,

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